

CLAIMS

1. A composite collapse resistant riser comprising:
a metal liner;
a reinforcing layer adjacent the outside of said liner;
a shear ply layer over said reinforcing layer; and
an outer main structural layer of composite material over said shear ply layer.
2. A riser of claim 1 wherein said reinforcing layer is selected from the group comprising dry fiber laminates, composite materials and combinations thereof.
3. A riser of claim 1 further comprising:
a performance enhancement layer on the inside of said liner.
4. A riser of claim 1 further comprising:
a fluid impermeable layer over said outer main layer of composite material.
5. A riser of claim 3 further comprising:
a scuff absorbing layer over said fluid impermeable layer.
6. A riser of claim 1 wherein said liner is selected from the group consisting of steel, aluminum and titanium.
7. A riser of claim 1 wherein said liner has at least one engaging surface on its outer surface.
8. A riser of claim 6 further comprising a performance enhancement layer on the inside surface of said layer.
9. A riser of claim 5 wherein said scuff absorbing layer is of composite material.

10. A composite collapse resistant riser comprising:
 - a riser core having a metal liner having a first end and a second end and metal composite interfaces positioned adjacent said first and second ends of said liner;
 - a reinforcing layer selected from the group consisting of dry fiber laminates, composite laminates and combinations thereof adjacent the outside of said liner;
 - a shear ply layer over said reinforcing layer; and
 - an outer main structural layer of composite material over at least a portion of said riser core and connected to each of said metal composite interfaces.
11. A riser of claim 10 further comprising:
 - a performance enhancement layer on the inside of said liner.
12. A riser of claim 10 further comprising:
 - a fluid impermeable layer over said outer main layer of composite material.
13. A riser of claim 12 further comprising:
 - a scuff absorbing layer over said fluid impermeable layer.
14. A riser of claim 11 wherein said metal liner is selected from the group consisting of titanium, aluminum and steel.
15. A riser of claim 13 wherein said metal liner is selected from the group consisting of titanium, aluminum and steel.
16. A riser of claim 10 wherein said metal liner has at least one engaging surface on its outer surface.
17. A riser of claim 13 wherein said metal liner has at least one engaging surface on its outer surface.
18. A riser of claim 10 further comprising at least one transition ring interposed between at least one of said metal liner and at least one of said metal composite interfaces.

19. A riser of claim 10 wherein said shear ply has a sealing section.
20. A riser of claim 13 wherein said shear ply has a sealing section.
21. A riser of claim 19 wherein said sealing section is a generally Y-shaped portion which is received in a groove of said metal composite interface.
22. A composite collapse resistant liner comprising:
 - a metal liner having a first end and second end;
 - a metal composite interface having one or more trap locks positioned at each end of said metal liner;
 - a reinforcing layer adjacent the outside of said liner;
 - a shear ply layer over said reinforcing layer; and
 - an outer main layer of composite material over said shear ply and engaging said trap locks.
23. A riser of claim 22 further comprising:
 - a performance enhancement layer on the inside of said metal liner.
24. A riser of claim 22 further comprising:
 - a fluid impermeable layer over said outer main layer of composite material.
25. A riser of claim 24 further comprising:
 - a scuff absorbing layer over said fluid impermeable layer.
26. A riser of claim 23 further comprising:
 - a fluid impermeable layer over said outer main layer of composite material.